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Digital Replicas May Change Face of Films

By Nick Wingfield
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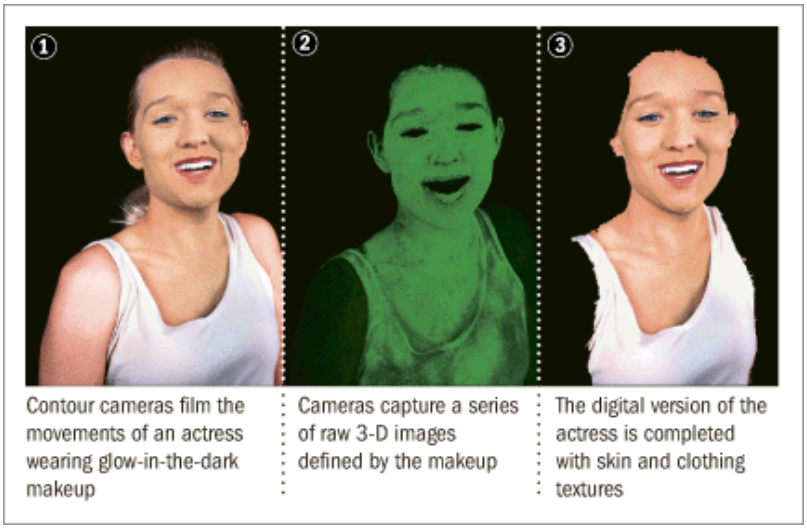
Steve Perlman became famous in Silicon Valley for pushing the boundaries of technology and entertainment. Now he is trying to change the face -- literally -- of characters in movies and videogames.

The veteran entrepreneur, best known for selling a pioneering set-top box company called WebTV Networks Inc. to Microsoft Corp. almost a decade ago, has devised technology that he says can create digital reproductions of the human body that are as accurate as photographs. If it works as planned, Mr. Perlman's system could open up a host of creative possibilities.

Game makers could use the system, called Contour, to create very realistic animated characters in videogames with fully controllable movements and facial expressions. Film makers could use the technology as a kind of digital makeup, changing an actor's looks or words or switch camera angles without costly retakes. The technology can even substitute one actor's face for another's and create exact replicas of long-dead historical figures. In a biopic such as "Walk the Line," for example, film makers could use Contour to alter Joaquin Phoenix's face to look exactly like Johnny Cash's while still capturing all the nuances of Mr. Phoenix's movements.



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"The promise of it is amazing," says David Fincher, the director behind movies like "Fight Club," "Se7en" and the forthcoming "Zodiac."

Mr. Fincher is considering using Contour to create effects for his next movie, "The Curious Case of Benjamin Button." The live-action film is about a character, played by Brad Pitt, who ages in reverse.

In theory, a film maker could use the Contour system to insert a digital replica of, say, Tom Cruise into a movie without Mr. Cruise's involvement, though an actor who roughly resembled Mr. Cruise would still be needed. Copyright laws will likely discourage many uses of an actor's likeness without their permission, Mr. Perlman says, though replicas of some public figures -- a famous politician in a parody, for instance -- might be acceptable.

Up to now, because of the difficulties of creating lifelike people, animation houses such as Walt Disney Co.'s DIS **-3.45%** ▼ Pixar have tended to build stories around objects such as toys or cars, or created exaggerated, comic-book renditions of humans.

More recently, movies such as "Polar Express" and the current "Monster House," have used a process called motion-capture to add realistic movement to digitally animated humans. Actors are typically asked to wear special suits equipped with sensors that record their motions. The process is also used to build characters in videogames.

But motion-capture doesn't typically create characters that look realistic, because it doesn't gather enough data to create a precise digital model. The biggest shortcoming has been the lack of an accurate rendering of the human face, with all of its muscles, wrinkles and seemingly infinite expressions.

Some companies are trying to push the capabilities of more traditional motion-capture to achieve greater fidelity -- for instance, game publisher Electronic Arts Inc. is using a technique it calls "universal capture" to create a more realistic Tiger Woods for a forthcoming golf game.

Mr. Perlman knows the limitations well because one of several companies he owns, Mova, has done motion-capture services for projects like "Polar Express" and "The Godfather" game. He has been putting his ample financial resources -- Microsoft paid more than $500 million for WebTV, he says -- into trying to solve the problem.

Contour combines some surprisingly mundane ingredients and sophisticated software. First, an actor's face is coated in ordinary phosphorescent makeup like that worn by children at

Halloween. The actors then conduct their performance in a studio surrounded by fluorescent lights and digital cameras.

The system turns the lights on and off at speeds so fast that the studio appears lit. But during those brief interludes of darkness, the actor's face glows brightly. The cameras that surround the actor snap digital images of the glowing face -- and body, if the actor's clothing is coated in a phosphorescent dye -- producing a ghoulish green three-dimensional computer image of the face.

After artists digitally insert a few important details into a face, including eyeballs, hair and natural-skin color, the striking facial details captured during the acting session become clear: flaring nostrils, furrowing brows and other subtle expressions make the digital face seem like the real thing. For creators of entertainment, detailed faces are crucial for creating believable characters.

"There's something about that thing that's so unique and is so important for movies and games," says John Riccitiello, a partner at investment firm Elevation Partners and the chief executive of game developer BioWare/Pandemic Studios. Mr. Riccitiello says BioWare/Pandemic is evaluating using Contour, the results of which he calls "stunning."

Many efforts to create realistic human replicas get tripped up by a phenomenon that some game and film makers call the "uncanny valley," a theory put forth more than three decades ago by a Japanese robotics expert. Viewers, the theory goes, are forgiving of visual flaws in human characters in games and films the more unreal they look, while they are repelled when, say, the eyes or smile of a more realistic-looking human don't look quite right. Mr. Perlman believes Contour will help film and game makers with the problem.

"For the first time they have a technique that can cross the uncanny valley," Mr. Perlman says.

Film makers could also use Contour to set back the clock on an actor's age, Mr. Perlman says, giving audiences, say, the Meryl Streep of "Sophie's Choice" from 1982 rather than "The Devil Wears Prada." There could be trouble, though, with actors that have attempted to slow the aging process on their own. Mr. Perlman says Mova has run into problems with facial captures, even with its older motion-capture system, when actors have recently had Botox injections, which can immobilize sections of the face. Now Mova asks actors to avoid Botox treatments for several months before they come in for facial capture sessions.

Mr. Perlman plans to show Contour publicly for the first time this week at the Siggraph computer graphics conference in Boston. He predicts the system will allow film makers to create photorealistic faces for roughly $2,000 per second of screen time.

By contrast, he says, using older motion-capture systems to create faces of lesser realism can cost between $50,000 and $100,000 a second because computer animators must still do costly reconstructions of details not captured by the technology. Mova will begin offering capture-services to clients using Contour in the fourth quarter.

The system is the result of years of trial and error by Mr. Perlman and a small team of engineers employed by Rearden LLC, a San Francisco-based holding company Mr. Perlman formed in the late 1990s as an incubator for new businesses. Although he isn't an engineer by formal training -- he was a liberal-arts major at Columbia University -- Mr. Perlman, 45 years old, is a lifelong inventor. The U.S. Patent and Trademark Office lists him as the inventor or co-inventor on 66 issued patents, extending back to his days in the late 1980s as an executive at Apple Computer Inc.

For the past several years, Mr. Perlman tried a hodgepodge of different methods to digitally capture faces, at one point using ultrasonic sounds to see if that would work (it didn't). He determined he could use phosphorescent makeup with $15 fluorescent light bulbs if he could blast enough electricity at the lights to get them to turn on instantly. He finally succeeded by using an electric starter for a barbecue.

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